DEPARTMENT OF ENERGY

1710-1850 MHz Band

Current Services Provided

The Department primarily uses this band for cost-effective management and control of power marketing functions. In the near future, a Tracking, Telemetry, and Control (TT&C) downlink for a satellite system is planned. This band is also used to support the nuclear waste management program, site security alarm systems, nuclear weapons test program, and control of robot operations.

Planned Services

Moderate growth in this band is expected due to the continually expanding demand for electrical power. Additionally, a 5-year experimental program is underway to implement a satellite system, ALEXIS, to gather data in support of the U.S. Treaty Verification Program, with a launch scheduled during 1992.

Existing Economic Investment

Current investment is $49 million.

Alternative Bands

Alternatives are 4400-4990 MHz or 7-8 GHz for the fixed operational microwave services. No alternative band is available for TT&C for ALEXIS.

Projected Cost of Moving

Projections are $124 million for fixed operational microwave equipment only. If a higher fixed band is used, current estimates are $.5 million per added repeater site required due to reduced propagation with total cost to be determined. If other alternatives such as fiber optic cable are used, costs to replace the operational microwave radio systems could be in the billions of dollars. An additional $2 million will be required for ALEXIS.

2200-2290 MHz BAND

Current Services Provided

Several DOE sites use this band for operational telemetry in support of airborne vehicle testing, nuclear event support, data transmissions from dropped vehicles, timing and control weapons testing equipment, and data relay from remote sites to control facilities. Most of these operations are in support of DOD. Also, in the near term, this band will be used for a Telemetry, Tracking & Control (TT&C) uplink for the ALEXIS satellite system.

Planned Services

Continue current operations. Additionally, a 5-year experimental program is underway to implement a satellite system, ALEXIS, to gather data in support of the U.S. Treaty Verification Program with a launch scheduled for 1991.

Existing Economic Investment

Current investment is $2 million.

Planned Economic Investment

Estimates are $2.25 million, plus continued costs for operations and maintenance.

Alternative Bands

Some use of the 1427-1530 MHz and 2310-2390 MHz bands may be possible. Once launched, no other Government TT&C band is available.

Projected Cost of Moving

Projections are $6 million.

DEPARTMENT OF JUSTICE (FEDERAL BUREAU OF INVESTIGATION)

1710-1850 MHz BAND

Service provided - Ancillary devices and fixed links between VHF repeaters, base stations, and control points.

Existing economic investment - $2 million for law enforcement ancillary devices; $43.1 million for fixed microwave stations.

Alternative bands that could be used - The only available spectrum to replace over 700 fixed stations presently operating in this band is the 7125-8500 MHz band. Due to the propagation characteristics of the 7/8 GHz band, additional relay points are necessary. The replacement cost of present equipment alone is conservatively estimated to be $35 million ($50,000/site x 700). Assuming land is available, and based upon the projection that 25% of the existing facilities will require one or more intermediate relay stations, over 175 new stations must be designed. Land acquisition, facility construction, and equipment procurement costs for these new stations are estimated to be over $43,750 million ($250,000/site x 175).

Changing the current operational frequencies of these ancillary devices to other bands would require a minimum of five years at a cost of $42.5 million. These particular law enforcement ancillary devices are basically designed for use under adverse conditions. Required response times and the need for clandestine installation preclude the use of such techniques as fiber optic or coaxial cables. The unprogrammed and unnecessary cost for a reaccommodation in this band is $81.25 million for the FBI alone.

United States Postal Service

The current investment in radio communications equipment is estimated at $45-$50 million dollars. The primary bands allocated by the Interdepartment Radio Advisory Committee (IRAC) and currently in use by the U.S. Postal Service include: (1) UHF 406-420 MHz; (2) VHF 162-174 MHz; and (3) 1800 MHz. Our investment in these bands is estimated to be: (1) UHF - 65 percent; (2) VHF - 34 percent; and (3) 1800 MHz - 1 per cent.

DEPARTMENT OF INTERIOR

1700-1850 and 2200-2290 MHz Bands

Current Services Provided and Mission Supported

Fixed Point-to-Point: DOI microwave systems are primarily designed to facilitate interconnection of lo-band, VHF and UHF land mobile radio networks, typically installed on higher elevation sites to increase coverage. The medium capacity links (24-96 channel) generally interconnect multiple facilities, while the low density (12-24 channel) microwave paths are for feeder links from offices in smaller towns and cities. When seasonal personnel are not manning remote offices, these back-bone microwave links are usually configured to tie the land mobile networks back to a full-time, centralized, dispatch center.

Planned Services

Fixed Point-to-Point: Trends indicate the growth of low and medium density microwave to continue at 4-5 percent annually. Earlier projections of 5-10 percent did not take into account access to the 932/941 MHz bands.

Existing Economic Investment

Fixed Point-to-Point: The Department of the Interior has approximately 400 fixed stations operating between 1.7-2.29 GHz. The present value of installed equipment is conservatively estimated to be $20 million ($50,000/site x 400 sites).

Planned Economic Investment

Fixed Point-to-Point: Growth of new microwave radio systems is expected to stabilize at five percent annually. For purposes of this report, the cost of a new system is considered to average $100,000. The actual cost may be between $50,000 and $250,000 depending upon whether an existing site is used, or new site development is required. Accordingly, annual growth is projected to be $2 million ($100,000 each x 20 sites/year).

Alternative Bands that could be Used

Fixed Point-to-Point: Some "thin route" links, i.e., 12 or less channels, could be accommodated in 932/941 MHz or 1427-1435 MHz bands. Most DOI microwave in these bands support 24 or more channels. However, since very few DOI microwave systems will require more than 96 channels, use of frequencies above 5 GHz, e.g., 7/8 GHz, is not spectrally efficient. Use of spectrum above 20 GHz for fixed operations is further complicated by atmospheric absorption of millimeter waves by water or oxygen molecules.

Projected Costs of Moving Operations

Fixed Point-to-Point: The replacement cost of present equipment alone is $20 million ($50,000/site x 400). However, since sufficient spectrum for the replacement of Federal Government networks is unavailable below 7/8 GHz, additional relay points are necessary. Assuming land is available, and based on the projection that 25% of the existing facilities will require one or more intermediate relay stations, 100 new stations must be designed from the ground up. Land acquisition, facility construction and equipment procurement costs for 100 new stations are estimated to be $25 million ($250,000/site x 100). The cost to relocate existing microwave is $45 million.

DEPARTMENT OF AGRICULTURE

1.7-1.8 GHz Band

Current Services Provided and Mission Supported

The primary USDA user of this band is the Forest Service with microwave backbone systems supporting land-mobile communications systems, voice telephone systems, and data communications systems on most of the national forests.

Planned Services

Planned services are oriented toward expansion of the backbone systems and will (in many cases) replace fixed facilities now in the 406-420 band.

Existing Economic Investment

The combined investment of all USDA agencies having radio systems installed in this band includes over 1200 stations at an investment of over $36,000,000.

Planned Economic Investment

It is hard to forecast the USDA direction in this band because of several outside factors. Most of these factors have already been covered in previous paragraphs talking about the availability of the 900 MHz band. If there are no major changes in band availability, we estimate the growth to be between $1 - 2 Million per year.

Alternative Bands That Could Be Used

As was mentioned previously, the 900 MHz band (if assignments become available) could offset some use of this band. The 7 GHz bands would also be a reasonable (but more costly) alternative.

Projected Costs of Moving Operations

Costs of moving to an alternative band would be at least that of the original investment since equipment and labor is steadily increasing and all equipment would have to be replaced. We estimate a move from this band would cost between $30 and 440 million.

FEDERAL AVIATION ADMINISTRATION (FAA)

The services provided by the FAA promote aviation safety and efficiency for the private sector, military, and other government agencies. Under Congressional mandate, the FAA has embarked on a multi-billion dollar upgrade of the National Airspace System (NAS) in order to assure the continued safety and efficiency of the NAS. This upgrade requires additional spectrum dependent systems to handle the increased traffic loads and system functional improvements.

The 1710-1850 MHz supports the land point-to-point communication requirements for aviation. The FAA investment in the 1710-1850 MHz band is 350 million and 1 million in the 2200-2290 MHz band.

APPENDIX B

COORDINATION CONTOUR FOR TRANSMITTING EARTH STATIONS IN THE 1761-1842 MHz BAND

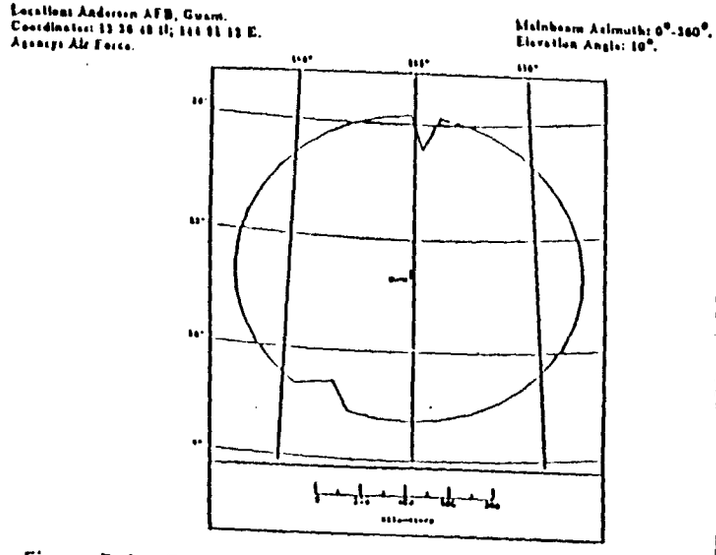

Figure B-1. Coordination contour for the Anderson AFB, Guam Transmitting Earth Station.

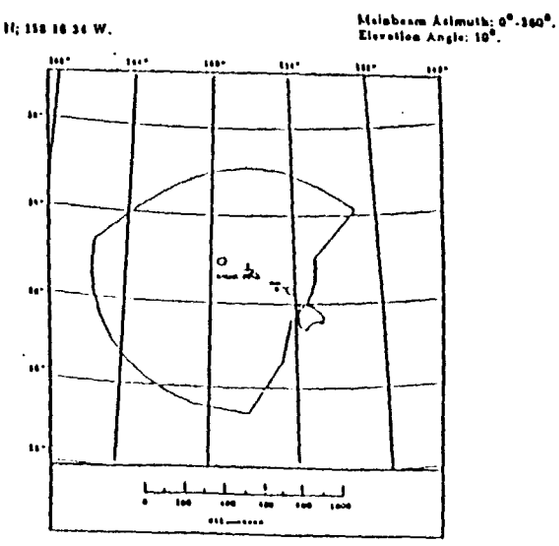

Figure B-2. Coordination contour for the Kaena Pt., Hawaii Transmitting Earth Station.

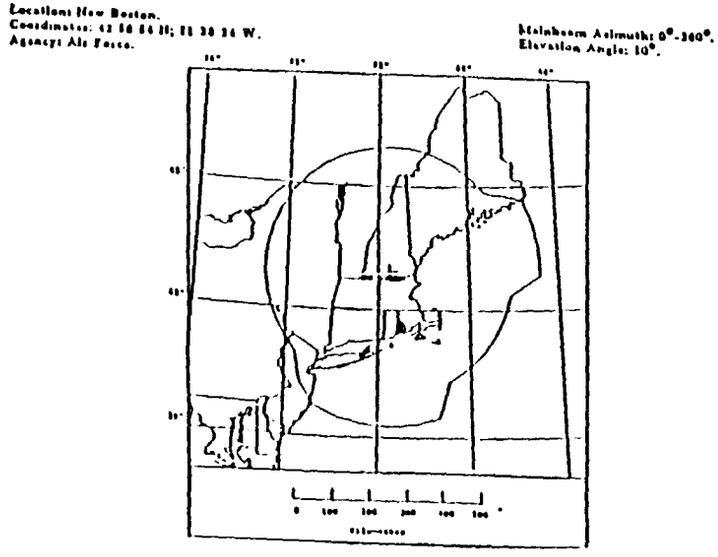

Figure B-3. Coordination contour for the New Boston, New Hampshire Transmitting Earth Station.

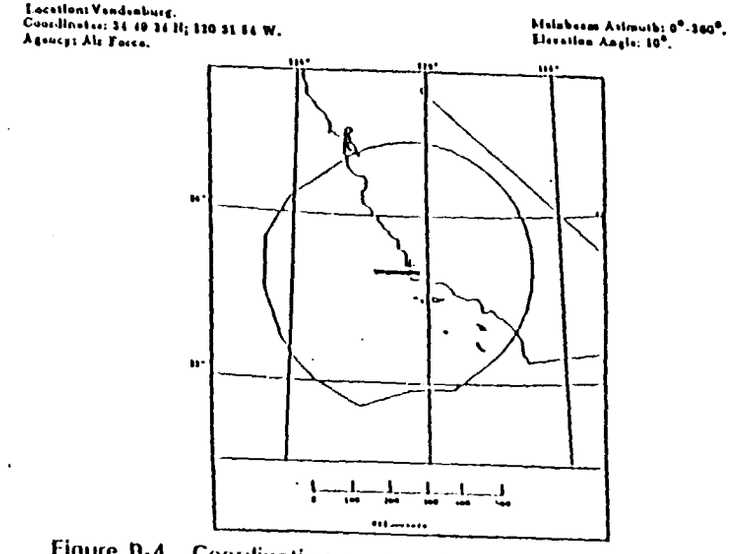

Figure B-4. Coordination contour for the Vandenburg AFB, California Transmitting Earth Station.

APPENDIX C

COORDINATION CONTOUR FOR RECEIVING EARTH STATIONS IN THE 1761-1842 MHz BAND

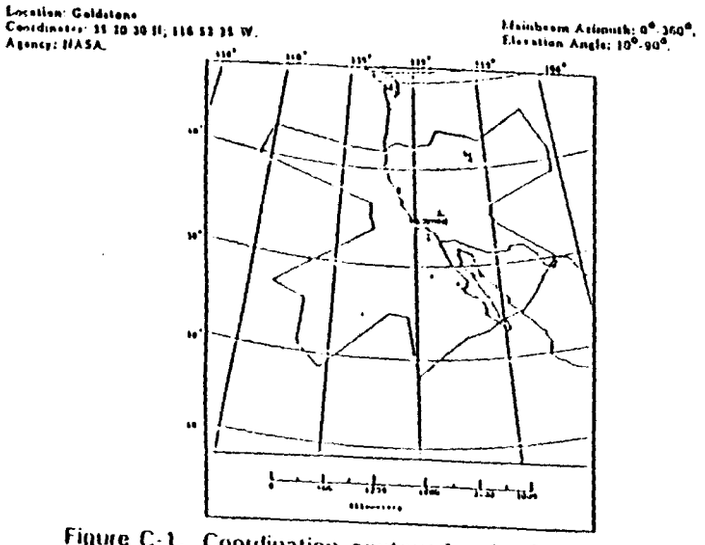

Figure C-1. Coordination contour for the Goldstone, California Receiving Earth Station.

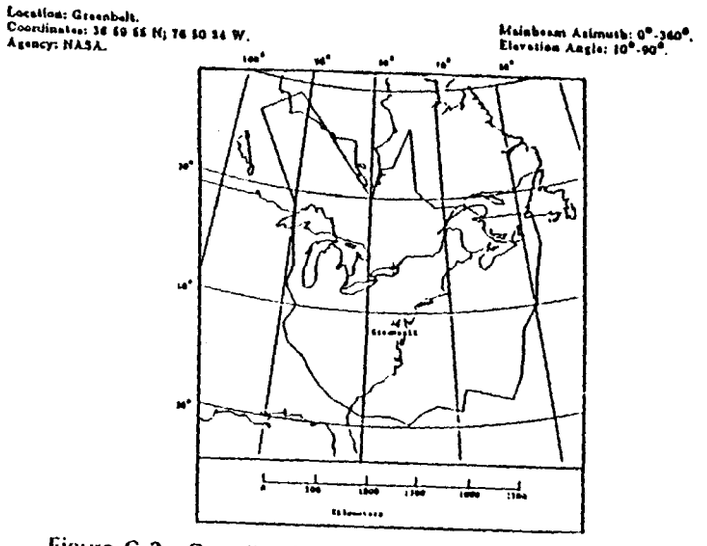

Figure C-2. Coordination contour for the Greenbelt, Maryland Receiving Earth Station.

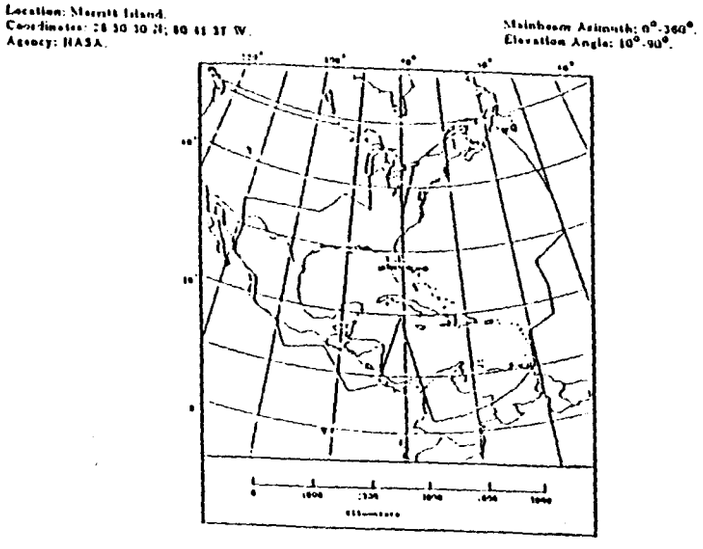

Figure C-3. Coordination contour for the Merritt Island, Florida Receiving Earth Station.

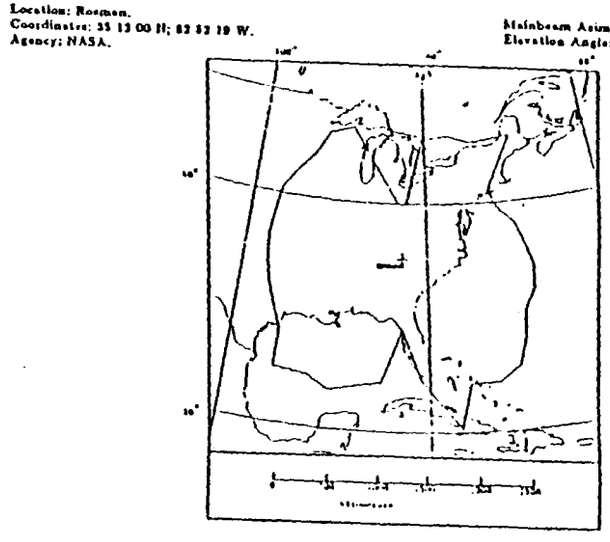

Figure C-4. Coordination contour for the Rosman, North Carolina Receiving Earth Station.

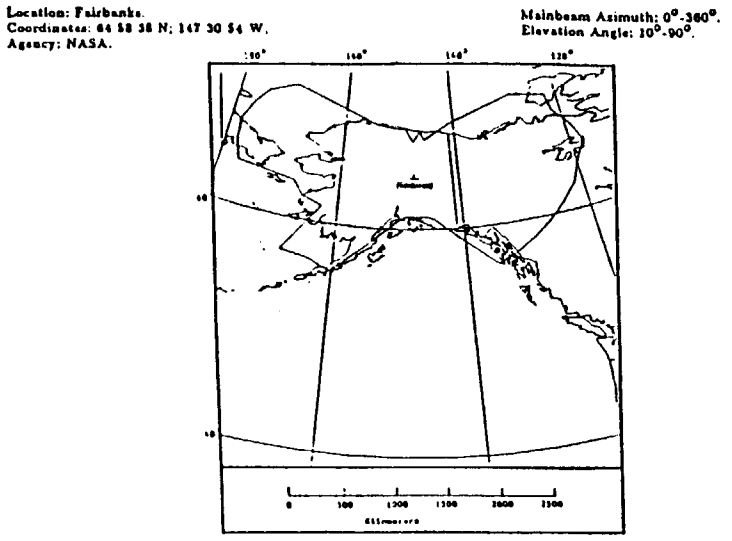

Figure C-5. Coordination contour for the Fairbanks, Alaska Receiving Earth Station.

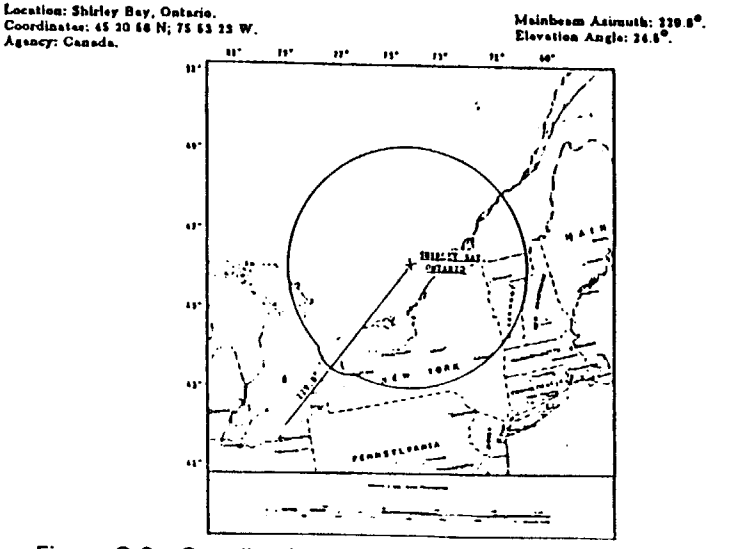

Figure C-6. Coordination contour for the Shirley Bay, Ontario Receiving Earth Station.

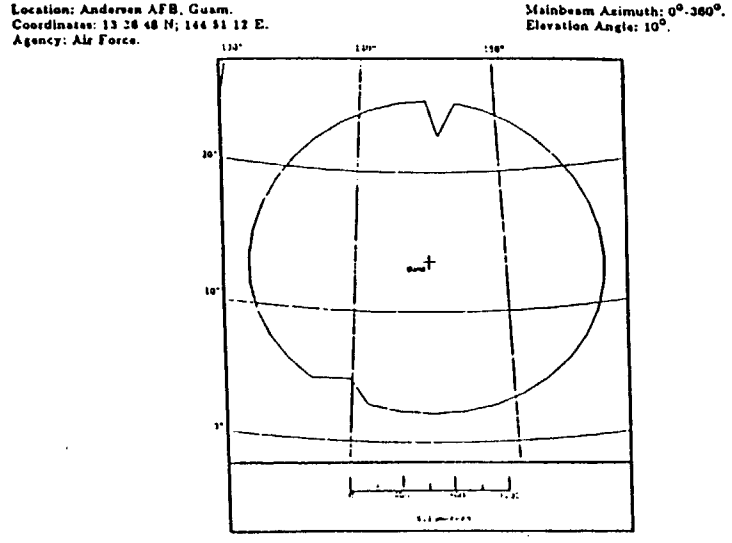

Figure C-7. Coordination contour for the Anderson AFB, Guam Receiving Earth Station.

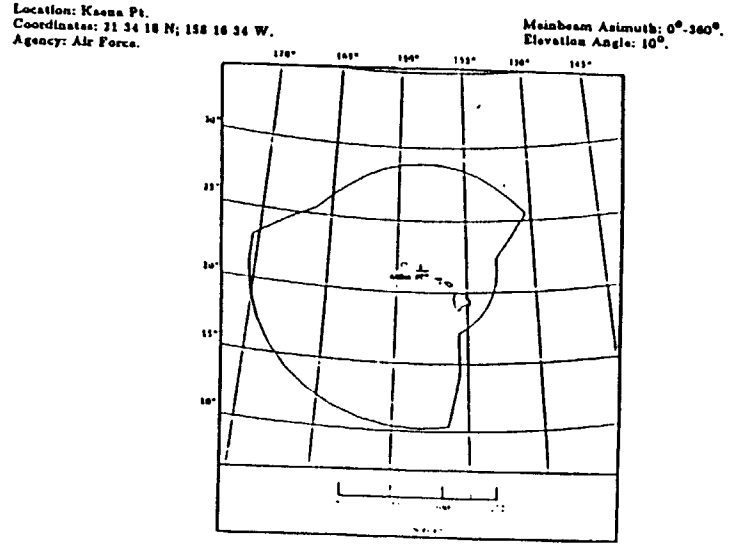

Figure C-8. Coordination contour for the Kaena Pt., Hawaii Receiving Earth Station.

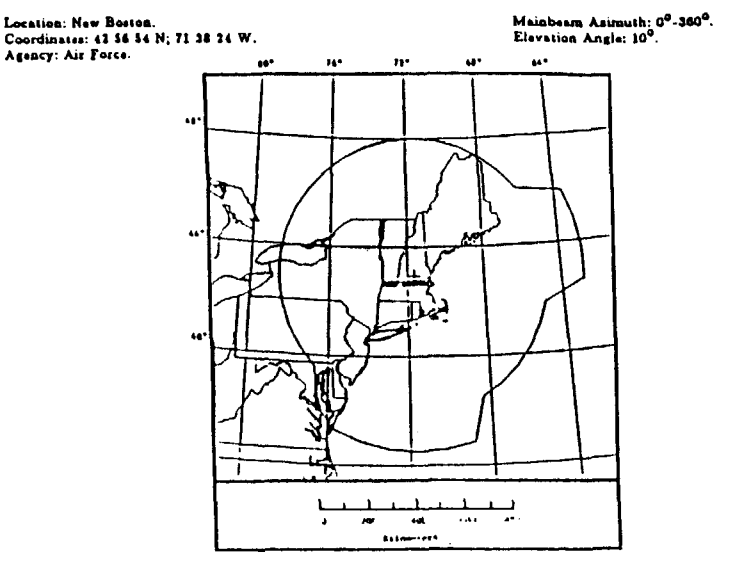

Figure C-9. Coordination contour for the New Boston, New Hampshire Receiving Earth Station.

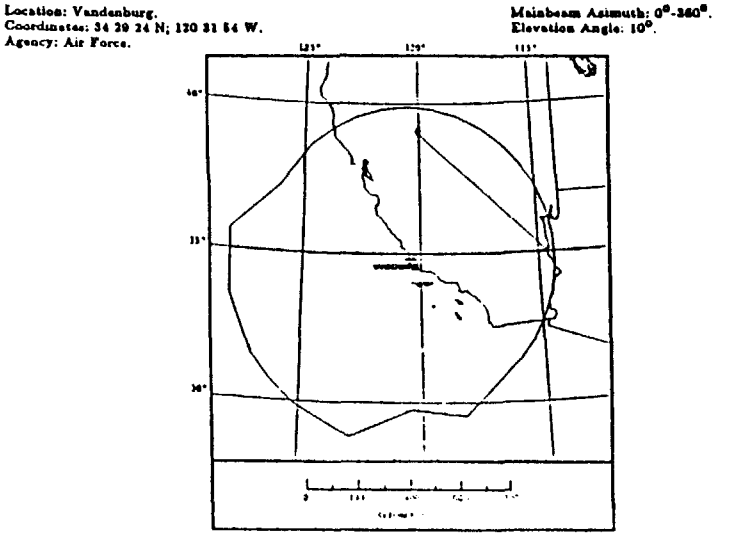

Figure C-10. Coordination contour for the Vandenburg AFB, California Receiving Earth Station.

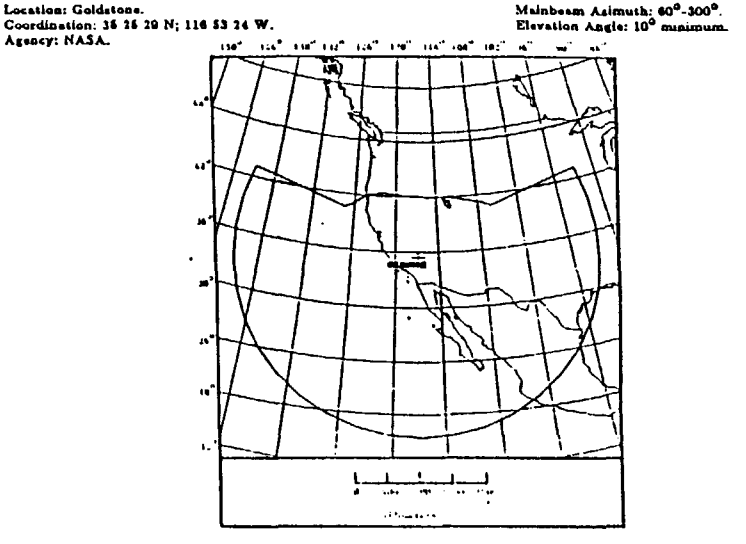

Figure C-11. Coordination contour for the Goldstone, California Receiving Earth Station.

REFERENCES

1. NTIA, *Manual of Regulations and Procedures for Federal Radio Frequency Management*, U.S. Department of Commerce, National Telecommunications and Information Administration, Washington, D.C., May 1989 Edition, Revised January 1990.

2. Federal Communications Commission's Notice of Inquiry, General Docket No. 90-314, FCC 90-232, June 28, 1990.

3. Hurt, G. and Crandall, G., *Spectrum Resource Assessment in the 1710-1850 MHz Band*, NTIA-TM-79-26, U.S. Department of Commerce, November 1979.

4. Flynn, F., *Spectrum Resource Assessment in the 2200-2300 MHz Band*, NTIA Report 80-48, U.S. Department of Commerce, September 1980.

5. NTIA, OSM Memorandum to the IRAC Representatives, *"Government Spectrum Usage Information,"* February 11, 1990.

6. Haines, R. H. and S. E. Litts, *The SUM Land Mobile Model: Application of the Spectrum Use Measure to the Land Mobile Service*, NTIA Technical Report TR-89-248, September 1989.

7. Mayher, R. J., R. H. Haines, S. E. Litts, L. A. Berry, G. F. Hurt, C. A. Winkler, *The SUM Data Base: A New Measure of Spectrum Use*, NTIA Report 88-236, August 1988.

8. Haines, R., *Spectrum Resource Assessment of Selected U.S. Government Space Services*, NTIA TM-88-136, U.S. Department of Commerce, September 1988.

9. Wooden, W., *Navstar Global Positioning System*, Defense Mapping Agency, Los Angeles, CA, 1985.

10. Letter with Enclosure from Robert M. Lewis, DOE, to E. Dinkle, Executive Secretary IRAC, IRAC Document 26848/1, May 16, 1990.

11. *Aviation Week and Space Technology*, McGraw-Hill publication, May 7, 1990.

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Ernesto A. Cerezo

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15. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

This Spectrum Resource Assessment (SRA) is an integral part of the National Telecommunications and Information Administration (NTIA), Office of Spectrum Management (OSM) long-range planning process related to national and international interests that focus on radio frequency spectrum topics. The SRA includes a description of the current Federal Government spectrum use of the 1710-1850 MHz and 2200-2290 MHz bands and an estimate of the Federal Government investments in these bands.

Specifically, the SRA provides updated information on allocations, technical standards, frequency assignments, channeling plans and spectrum usage of the 1710-1850 MHz and 2200-2290 MHz bands. It also includes updated information on major systems currently operating or planned for operation in these bands and their technical or operational characteristics.

Note, however, that pertinent information related to the Government spectrum use and investment included in this report are based soley on unclassified frequency assignments or systems authorized for use in these bands.

16. Key Words *(Alphabetical order, separated by semicolons)*

1710-1850 MHz Band; 2200-2290 MHz Band; Earth Exploration Service; Fixed Service; Mobile Service; Radio Astronomy Service; Space Operations Service; Space Research Service; Space Systems; Spectrum Usage

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